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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/502,277	07/23/2004	Kiyoshi Kurosawa	5703-000001/US	3623

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EXAMINER	
PATEL, PARESH H	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/502,277	KUROSAWA ET AL.	
	Examiner	Art Unit	
	Paresh Patel	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *22-26* is/are allowed.

6)☒ Claim(s) *1-11,14,15,20 and 21* is/are rejected.

7)☒ Claim(s) *12-13,16-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 July 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *07/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Species of Fig. 1 in the reply filed on 02/28/2006 is acknowledged. **Election/Restriction requirement of the last office action is now withdrawn**.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the polarizer of claim 16 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-8, 10-11, 14-15 and 20 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Applicants admitted prior art (Fig. 11-14, particularly fig. 11, see US Pub. 20050083033 A1) and Taniuchi et al. (US 4554449).

Regarding claim 1, Applicants admitted prior art (hereafter AAPA) at pages 2-4 discloses a current measuring apparatus comprising:

an optical fiber sensor [2] extended or looped around a conductor [1] through which a current to be measured flows, linearly polarized light [line 5 of paragraph 0006] emitted from a light source and propagated through said optical fiber sensor having a plane of polarization rotated [lines 4-5 of paragraph 0006] under a magnetic field generated by the current to be measured [paragraph 0004];

a photoelectric converter [lines 4-7 of paragraph 0016] for converting into an electrical value an angle of rotation of the plane of polarization of the linearly polarized light after it exits said optical fiber sensor; and

a photocircuit [3, 4, 7] disposed between said optical fiber sensor and said photoelectric converter, said photocircuit including a birefringent member [4] for separating the linearly polarized light into an ordinary ray and an extraordinary ray [lines 9-10 of column 0006] by birefringence and outputting the ordinary and extraordinary rays, said current measuring apparatus further comprising:

a plurality of optical fibers [5, 6] for transmitting the ordinary ray from the birefringent member of the photocircuit to said photoelectric converter, while transmitting the extraordinary ray from the birefringent member of the photocircuit to said photoelectric converter; and

a maintaining means [aligning, see paragraph 0011. Also see lines 1-10 of column 3 of Taniuchi et al.] adapted to maintain said plurality of optical fibers with a gap of a predetermined size [distance between 5 and 6, Also see lines 48-68 of column 3 of Taniuchi et al.] being formed therebetween, said plurality of optical fibers having one end [e.g. end of 5, 6 to wards 7] and an opposite end, said one end of the plurality of optical fibers being disposed in the vicinity of said birefringent member [vicinity of 4], and said opposite end being connected to said photoelectric converter [paragraph 0016].

Regarding claim 2, AAPA in fig. 11 discloses a current measuring apparatus according to claim 1, wherein a separation distance between the ordinary ray and the

extraordinary ray in said birefringent member is matched to said predetermined size of the gap in the maintaining means.

Regarding claim 3, Taniuchi et al. in fig. 2 discloses a current measuring apparatus according to claim 1, wherein said photocircuit further comprises a lens system [11-13] disposed between an end of said optical fiber sensor and said birefringent member, focal points of said lens system being formed at said end of the optical fiber sensor and said one end of the optical fibers.

Regarding claim 4, Taniuchi et al. in fig. 3 discloses a current measuring apparatus according to claim 1, wherein said maintaining means comprises a gap maintaining member [11 and 12] for maintaining said optical fibers parallel to each other with the gap of a predetermined size being formed therebetween.

Regarding claim 5, AAPA in fig. 11 discloses a current measuring apparatus according to claim 4, wherein said optical fiber sensor [2] has one end on which the linearly polarized light is incident and an opposite end by which the incident linearly polarized light is reflected, the reflected linearly polarized light being adapted to exit the optical fiber sensor from said one end.

Regarding claims 6, AAPA in fig. 11 discloses a current measuring apparatus according to claim 5, wherein said photoelectric circuit further comprises a Faraday element [3] disposed between said one end of the optical fiber sensor [end of 2 at 7] and said birefringent member [4], said Faraday element being adapted to rotate the plane of polarization of the linearly polarized light through 22:5.degree. [paragraph 0006].

Regarding claims 7, AAPA in fig. 11 discloses a current measuring apparatus according to claim 6, wherein said plurality of optical fibers comprises: a first optical fiber [5] for transmitting the light from said light source to said birefringent member and transmitting the ordinary ray returned from said birefringent member to said photoelectric converter; and a second optical fiber [6] for transmitting the extraordinary ray returned from said birefringent member to said photoelectric converter.

Regarding claims 5, 6 and 8 Taniuchi et al. in fig. 2-4 discloses a current measuring apparatus including both ends of optical fiber sensor [9], faraday element [14] between one end of optical fiber sensor [9] and birefringent member [12], wherein said lens system [13] is disposed between said one end of the optical fiber sensor [9] and said birefringent member [12], the focal points of said lens system [13] being formed at an end-face core portion of said optical fiber sensor [end of 9] and an end-face core portion of said first optical fiber [9].

Regarding claims 5, 6 and 10 Taniuchi et al. in fig. 2-4 discloses a current measuring apparatus, wherein said photocircuit [11-13] further comprises: a second birefringent [12] member having the linearly polarized light from said optical fiber sensor directed thereto through said Faraday element [14] and being adapted to separate the linearly polarized light into an ordinary ray and an extraordinary ray that are orthogonal to each other; and

a second Faraday element [14] for rotating respective planes of polarization of the ordinary ray and the extraordinary ray from said second birefringent member through 45.degree. [lines 57-68 of column 2], said birefringent member being arranged

such that the ordinary ray with the 45.degree.-rotated plane of polarization is transmitted therethrough on a light axis, while the extraordinary ray with the 45.degree.-rotated plane of polarization is refracted by birefringence so that the ordinary ray and the extraordinary ray exit said birefringent member with an increased separation distance, said birefringent member being arranged such that, out of the light emitted from the light source, linearly polarized light incident along a plane orthogonal to a plane containing a crystal axis of said birefringent member and the light axis is transmitted therethrough on the light axis, and outputted to said second Faraday element.

Regarding claim 11, Taniuchi et al. in fig. 2-4 discloses a current measuring apparatus according to claim 10, wherein said plurality of optical fibers comprises: a polarization preserving optical fiber for directing said random light from the light source to said birefringent member [9]; a first optical fiber [9] for transmitting the ordinary ray emerging from said birefringent member to said photoelectric converter; and a second optical fiber [10] for transmitting the extraordinary ray emerging from said birefringent member to said photoelectric converter [22-23].

Regarding claim 14, AAPA in fig. 11 discloses a current measuring apparatus according to claim 5, wherein said optical fiber sensor is a reflection type sensor [2].

Regarding claim 15, AAPA in fig. 11 discloses a current measuring apparatus according to claim 1, wherein said optical fiber sensor [2] has one end on which the linearly polarized light is incident and an opposite end from which the incident linearly polarized light is outputted.

Regarding claim 20, AAPA in fig. 14 discloses a current measuring apparatus according to claim 15, wherein said optical fiber sensor is a transmission type sensor.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taniuchi et al. or AAPA and further in view of Simonelli (US 5272433).

Regarding claim 9 Taniuchi et al. in fig. 2-4 discloses a current measuring apparatus according to claim 8. Taniuchi et al. or AAPA is silent about wherein said gap maintaining member comprises **a two-core ferrule** for maintaining said first optical fiber and said second optical fiber parallel to each other with the gap of a predetermined size being formed therebetween. Simonelli discloses field sensor to measure electric field direction comprising ferrule 7 to support optical fiber 2. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use ferrule as taught by Simonelli with sensor of AAPA or Taniuchi et al., in order to support the optical fiber(s) during sensing of the field.

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taniuchi et al. or AAPA as applied to claim 1 above.

Regarding claim 21, Taniuchi et al. or AAPA discloses all the elements including wherein: said photoelectric converter comprises a first photoelectric converter element [not shown] and a second photoelectric converter element [not shown]; and said plurality of optical fibers comprises: a first optical fiber [5] for transmitting the ordinary ray from the birefringent member to said first photoelectric converter element; and a second optical fiber [6] for transmitting the extraordinary ray from the birefringent member to said second photoelectric converter element. Taniuchi et al. or AAPA is silent about an average value of an index of modulation being calculated with respect to each of two electrical signals obtained by said first and second photoelectric converter elements. However, calculation of index of modulation to measure intensity of field is well known in the art. Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made to calculate index of modulation as claimed, since intensity of field is measured using current sensor of Taniuchi et al. or AAPA to measure the current of a conductor.

Allowable Subject Matter

7. Claims 22-26 are allowed.

8. Claims 12-13 and 16-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: No prior art has been found that meets the limitation of claims 12-13 calling for

a current measuring apparatus comprising a photocircuit further comprises a lens system [13] disposed between said one end of the optical fiber sensor and said second birefringent member, focal points of said lens system being formed at an end-face core portion of said optical fiber sensor and an end-face core portion of said polarization preserving optical fiber as further defined at claim 12.

No prior art has been found that meets the limitation of claims 16-19 calling for a current measuring apparatus comprising a photocircuit further comprises a polarizer for transmitting only linearly polarized light out of random light emitted from the light source, said one end of the optical fiber sensor being disposed in the vicinity of said polarizer, said opposite end of the optical fiber sensor being disposed in contact with said birefringent member, a transmission axis of said polarizer and a crystal axis of said birefringent member being angularly displaced at 45.degree. relative to each other, to thereby enable said birefringent member to separate the linearly polarized light emitted from said optical fiber sensor into the ordinary ray and the extraordinary ray that are orthogonal to each other, as further defined at claim 16.

No prior art has been found that meets the limitation of claims 22-26 calling for a current measuring apparatus comprising a first optical fiber for directing the linearly polarized light to said birefringent member, while transmitting the ordinary ray emerging from the birefringent member to said photoelectric converter; and

a second optical fiber for transmitting the extraordinary ray emerging from the birefringent member to said photoelectric converter, said photocircuit further including a lens system disposed between said input end of the optical fiber sensor and said

birefringent member, focal points of said lens system being formed at an end-face core portion of said optical fiber sensor and an end-face core portion of said first optical fiber, as further defined at claim 22.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paresh Patel whose telephone number is 571-272-1968. The examiner can normally be reached on 8:00 to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha Nguyen can be reached on 571-272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paresh Patel
Primary Examiner
Art Unit 2829

June 12, 2006